

JPRS-EST-93-037  
24 November 1993



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# ***JPRS Report***

# **Science & Technology**

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***Europe/International***

# Science & Technology

## Europe/International

JPRS-ET-93-037

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## TELECOMMUNICATIONS

### Profile of German Telecommunications Industry

BR2610134993 Maidenhead TELEFACTS in English  
Sep 93 pp 10-18

[Article by Sarah Griffiths of Datapro International: "Germany: The Commercial and Regulatory Environment"; this article is based on a Datapro report with the same title which was published in Datapro's INTERNATIONAL TELECOMMUNICATIONS INFORMATION SERVICE dated September 1993.]

[Text] For Germany, the 1990s have so far proved to be challenging: politically, economically, and socially. Begun in October 1990, the reunification of the two German states—East and West—has been a considerable responsibility and a major drain on resources. Nevertheless, the Christian Democrat Chancellor Helmut Kohl and his coalition government have faced the challenge with fortitude.

The annexation of the five east German laender (bringing the total number of laender to 16) increases Germany's geographical area to around 357,000 sq km and the population to just under 80 million—with the eastern laender making up one-fifth of the total. Reunification has heightened problems of disparity between the two regions, such as the levels of unemployment, industrial production, and even the differing perceptions of immigrant minorities. Furthermore, recession in the eastern region has compounded the pressures being felt in the western region. With much of the physical and administrative infrastructure having to be built up from scratch, the demands on the Kohl government are considerable. Moreover, there has been a gradual realization that the western laender are going to have to continue financing the eastern laender for quite a few years to come, and a figure of around DM150 billion in funding per annum is foreseen.

The world telecommunications services market is predicted to achieve a turnover of DM1,500 billion by the year 2000 (from DM700 billion in 1991) according to Prognos—representing growth of 10 percent per annum. The German telecommunications market is predicted to achieve a similar growth rate and a turnover of DM135 billion—DM100 billion for services and DM35 billion for equipment—by the year 2000. According to ZVEI, the German electrical and electronics market generated DM219 billion in 1991, of which 35 percent came from the information and communications technology sector—projected to increase its share to 44 percent of an estimated DM420 billion turnover by the year 2000. Figure 1 shows the growth forecasts in Germany's telecommunications markets and the principal competitors.

### Growth Forecasts in Telecommunications Market Segments (1990-1995)

—Mobile radio: 30 percent;

—Value-added Services: 22 percent;

—Broadcasting: 15 percent;

—Transport services: 10 percent;

—Telephone services: 3.5 percent;

—Terminal equipment: 2 percent;

Market Suppliers: Mobile Radio: Mannesmann Mobilfunk (Pactel, Cable & Wireless), EI Consortium.

Value-Added Services: AT&T, BT [British Telecom], France Telecom, EDS [Electronic Data Systems].

Transport Services: MegaNet, Geisco, EDS, Infonet.

Terminal Equipment: AT&T, Alcatel, Nokia, Siemens, Sony. [end box]

Deutsche Telekom is Germany's main telecommunications operator and the largest telecommunications enterprise in Europe. In a ranking of world operators compiled by DATE/TELECOM MAGAZINE at the end of 1992, Deutsche Telekom held second place overall behind NTT [Nippon Telephone and Telegraph] and in front of AT&T, BT, and France Telecom. In terms of increase in turnover over the 1991 period, Deutsche Telekom still managed to come within the top 10 with a 16.3 percent rise—despite having to include the reunification expenses during this financial period.

The initial reactions of the national operators to the 1987 EC Green Paper on Telecommunications, aiming to bring about liberalization of the telecommunications equipment and services markets throughout the EC member states, showed varying levels of willingness to comply. The German Government, in particular, has been one of the most reluctant to relinquish its state monopoly on telecommunications.

Direct action in 1987 from the EC under Articles 90 and 37 of the Treaty of Rome, which forbids an EC government imposing the conditions which constitute cartels or the abuse of dominant position on public enterprises and forbids the creation of new monopolies, prompted the government to consider a major reform of the postal and telecommunications system in May 1988.

The first move toward a deregulated and competitive telecommunications market took place in mid-1989 with the Postal Reform I, which brought about considerable restructuring of the Deutsche Bundespost (DBP), as well as creating a new regulatory framework to cover the telecommunications sector.

As a result of the Deutsche Bundespost Constitution Act 1989, the operational and regulatory functions of Deutsche Bundespost were finally separated: Operation of postal and telecommunication services are the responsibility of Deutsche Bundespost Postdienst and Deutsche Bundespost Telekom, whilst Deutsche Bundespost Postbank handles postal banking services. The Act also

granted Deutsche Bundespost Telekom greater entrepreneurial independence—a move which was seen to be necessary due to the increasing pressures of a competitive telecommunications market.

The three sections making up the Deutsche Bundespost are each responsible to the Bundesminister fuer Post und Telekommunikation (BMPT) (Federal Minister for Posts and Telecommunications). The BMPT's responsibilities include setting long-term goals, approving financial plans, setting standards, as well as a number of regulatory functions. Two further bodies also have responsibility for regulation of telecommunications:

- The Bundesamt fur Post und Telekommunikation (BAPT)—the Federal Office for Posts and Telecommunications—which is headquartered in Mainz and has offices throughout Germany. Amongst other things, the BAPT issues licenses for telecommunications installations; controls the radiofrequency spectrum; and ensures the adoption of standards.
- The Bundesamt fur Zulassungen der Telekommunikation (BZT)—the Federal Office for Telecommunications Approvals—carries out the approval of telecommunications equipment. Since the initial reform, there have been a string of further decisions affecting the telecommunications market:
- In December 1989, the BMPT granted a license to Mannesmann Mobilfunk to operate the second national digital cellular mobile radio network (i.e., the D2 network)—to compete with Deutsche Telekom's D1 network.
- In the summer of 1990, Deutsche Telekom introduced a new licensing scheme that allowed competitive operators to provide two-way interactive services permitting interconnection with the fixed public data network at both ends of a connection. More than 30 licenses have since been issued, of which around a dozen are for the provision of voice services.
- At the start of 1991, the terminal equipment market was liberalized.
- In Spring 1991, six private operators started to operate trial private trunked mobile radio (PMR), and a further 22 licenses to operate in areas of high demand were awarded in April 1992.
- In February 1993, the third digital mobile cellular radio license was awarded—the E1 network operating at 1,800 MHz.

Liberalization of the telecommunications market has been gradually brought about through a series of amendments to the Telecommunications Installations Act (*Fernmelde-anlagengesetz*, or FAG). The result has been to create a telecommunications market, which is generally held to be one of the most liberalized in Europe. Deutsche Telekom retains its monopoly on basic network infrastructure and voice telephony services.

In theory, the German network services market is liberalized, and both national and international service providers are free to seek a license and to operate network services. In the past, however, anticompetitive practices by Deutsche Telekom have prevented full liberalization, and its tariffs for leased lines and services to other service providers have been considerably higher than the European average. This means that companies such as BT, Info AG, and GE Information Services have been prevented from being able to operate effectively—leased line tariffs are now in the process of being reduced.

From the point of view of Deutsche Telekom, the demands of an international competitive market have overstretched the existing provisions for the operator as a state-owned enterprise. The increasing requirements of major customers, frequently with international operations, in combination with the deregulation of markets means that Deutsche Bundespost Telekom needs to have greater flexibility—in particular, Telekom's exclusion from international activity has been a considerable bugbear.

As a result, there have been calls for further reform of the Deutsche Bundespost—Postal Reform II—which would include the privatization of Deutsche Telekom (with the operator still having responsibility for the basic telecommunications network and provision of basic telecommunication services). There have been months of discussion and fierce opposition from the Social Democrats to the privatization plans and even the resignation, toward the end of 1992, of Minister for Posts and Telecommunications Christian Schwarz-Schilling after 10 years in office. In June 1993, the decision was finally made to privatize the national operator. The initial phase of the sell-off is planned to take place at the end of 1995/1996. DBP Postdienst, DBP Postbank, and Deutsche Telekom will all become limited companies. The government will retain a 51 percent stake in the overall holding company, which is yet to be established, and it is foreseen that this controlling share will gradually be reduced—possibly over a 10-year period following privatization, although this has not yet been decided.

Since the official reunification of Germany in October 1990, the main priority for Deutsche Telekom has been to complete the process of technological integration with eastern Germany as quickly as possible. Plans to integrate the services of East and West Germany had been drawn up as far back as 1989, when the regime in East Germany began to crumble. The need to modernize the existing telecommunications infrastructure in the eastern laender is urgent. Not only must Deutsche Telekom create an efficient network infrastructure throughout the unified Germany, but it must be seen to be dynamic and financially strong in order to retain its position as a world leader in the telecommunications arena.

#### The PTT Today

Despite the general trend throughout Europe to privatize the national telecommunications operators, Deutsche

Telekom is still a public corporation, owned by the Federal Republic of Germany. It is, therefore, bound by the laws and regulations imposed by the constitution, as well as by federal laws. In June 1993, however, the Federal Government agreed to embark on the privatization of Deutsche Telekom. At the FINANCIAL TIMES Conference on Telecommunications in Central and Eastern Europe, held in Berlin in July 1993, the minister for posts and telecommunications, Mr. Wolfgang Botsch, said that the necessary legislation was to be introduced during the second half of 1993, and privatization would take place in several stages starting toward the end of 1995 or the beginning of 1996. He also indicated that he intended the proceeds from the sale of the operator to be used to ensure the modernization of the telecommunications network infrastructure.

Privatization is viewed as a positive move for Deutsche Telekom. In the past, it has been seen to be somewhat hampered by its lack of independence and most particularly in terms of being restricted in its foreign activities and decisions on investment of capital. During 1992, Deutsche Telekom's revenues totaled DM50 billion, representing a 6.4 percent increase on 1991 revenues—revenues of DM80 billion by the year 2000 are being targeted. The operator currently employs around 250,000 people (see Table 1).

**Deutsche Telekom: Financial Overview**  
(in DM thousands)

|  | 1990*       | 1991        |
|--|-------------|-------------|
| Turnover                                   | 40,589,860  | 47,194,134  |
| Staff costs                                | 12,118,408  | 14,810,546  |
| Capital and reserves                       | 35,148,644  | 35,608,652  |
| Fixed assets                               | 108,817,797 | 121,194,070 |
| Net investments                            | 19,254,697  | 24,425,625  |
| Depreciation                               | 12,135,335  | 14,368,129  |
| Profit/depreciation for the financial year | 1,254,124   | -124,158    |

Footnote: \*Figures refer only to former West Germany Source: Deutsche Telekom

Voice Telephony currently accounts for around 90 percent of Deutsche Telekom's revenues. With the upsurge in mobile telephony and corporate data networks being used for voice communication, Deutsche Telekom estimates that this could reduce its revenues from voice telephony over the fixed network by around 5 percent by 1998—with Deutsche Telekom's revenues from voice telephony estimated at DM3.5 billion.

The business users and large customers sector will increase by 35 percent by 1995 (with the uptake of ISDN [integrated services digital network], mobile communications, and network management services), whilst the private user sector is predicted to grow by only 17 percent—as a result, by 1995, 55 percent of turnover will come from the business users' sector.

In order to meet the challenges of the competitive market and rapidly changing international telecommunications environments, Deutsche Telekom has made a number of organizational changes over the last couple of years. It has set three priority strategic objectives: to increase customer orientation; the decentralization of decisionmaking; and the improvement of Deutsche Telekom's efficiency.

As a result, in 1991, the sales and service organization was restructured to include independent sales and service units with the aim of better serving specific target groups such as residential and business customers. This has been followed by a further restructuring of Deutsche Telekom's corporate structure at the beginning of 1993 to increase the customer orientation. In January 1993, autonomous units were established, each being responsible for their respective professional activities.

Since the 1989 reform, Deutsche Telekom has made considerable changes in its strategy and has achieved an enviable position as the number one international carrier in the European market and number two worldwide. From being essentially oriented toward the domestic market, Deutsche Telekom is now developing its international presence. Already, there are five foreign wholly owned subsidiaries in New York, London, Tokyo, Paris, and Brussels. Offices have also been opened in Moscow and Budapest during 1992. The operator's efforts have not gone unrewarded: Deutsche Telekom has made major inroads, in particular, into the newly opened markets of Central and Eastern Europe. It sees its position within the European and international arena as crucial and has become involved in a number of European projects and agreements, including the joint ventures with France Telecom, EUCOM (for value-added services), and EUNETCOM (for outsourcing and facilities management).

### The Telephone Network

Deutsche Telekom still has a monopoly on telephone services, cable network infrastructure, and glass fiber optic network infrastructure. At the beginning of 1993, Deutsche Telekom had 34 million telephones connected to its telecommunications network, and between 60 percent and 65 percent of networks had been digitalized. Table 2 gives the latest available key network statistics.

**Deutsche Telekom: Key Services Statistics**

|                               | 1988 | 1989 | 1990 | 1991 |
|-------------------------------|------|------|------|------|
| PHONE SERVICES                |      |      |      |      |
| Phone connections (million)*  | 27.8 | 28.8 | 30   | 31.2 |
| Phone connections (million)** | 1.8  | 1.8  | 1.9  | 2.4  |
| Phone calls (billion)*        | 30.4 | 31.7 | 33.9 | 38.0 |
| Phone calls (billion)**       | 2.3  | 2.4  | 2.4  | 3    |

**Deutsche Telekom: Key Services Statistics (Continued)**

|                                   | 1988  | 1989  | 1990     | 1991      |
|-----------------------------------|-------|-------|----------|-----------|
| Voice mail boxes                  | 200   | 400   | 1,100*** | 2,700***  |
| ISDN:                             |       |       |          |           |
| Basic ISDN accesses               |       | 1,400 | 7,600*** | 41,400*** |
| Primary ISDN accesses             |       | 100   | 600***   | 2,600***  |
| DATA SERVICES (thousand):         |       |       |          |           |
| Datex-P connections               | 35.3  | 45.2  | 56.5***  | 69        |
| Datex-L connections               | 21.6  | 23.2  | 24.2***  | 24.7      |
| Leased data commo lines           | 184.7 | 204.6 | 231      |           |
| TEXT SERVICES (thousand):         |       |       |          |           |
| Telex connections                 | 158.3 | 134.4 | 134.5    | 111.9     |
| Telex calls (million)             | 212.1 | 157.3 | 112.3*** | 84.3      |
| Teletex connections               | 19.1  | 18.2  | 16.3***  | 14.1***   |
| Teletex calls (million)           | 22.8  | 19.9  | 15.2***  | 9.3***    |
| Telefax connections               | 197.2 | 411.1 | 696.2    | 946.2     |
| VIDEOCONFERENCE SERVICE:          |       |       |          |           |
| Videoconference studios           | 102   | 158   | 275      | 410       |
| Telekom video-conf. studios       | 13    | 12    | 40       | 60        |
| Private videoconf. studios        | 89    | 146   | 235***   | 350***    |
| MOBILE RADIO SERVICES (thousand): |       |       |          |           |
| Mobile phone connections          | 123.1 | 185.5 | 292.6    | 546.6     |
| C-network mobile phones           | 98.8  | 163.6 | 273.9    | 532.3     |
| Mobile calls (million)            | 27    | 150.8 | 192.4    | 251.9     |
| Eurosignal connections            | 171.9 | 191.8 | 204.6    | 210.3     |
| Cityruf subscribers               |       |       | 64.5     | 132       |
| Cityruf stations (Total)          |       |       | 319      | 575       |
| Chekker mobile stations           |       |       | 2.7      | 11.3      |
| Chekker base stations (Total)     |       |       | 24       | 55        |

All figures indicated for the years before and including 1989 refer to the service area of the former West Germany. Unless otherwise stated, figures on existing facilities and traffic volume for 1990 and 1991 include the results for the five eastern laender. (Source: Deutsche Telekom)

## Notes:

1) \* In the former West Germany only;

2) \*\* In the former East Germany only;

3) \*\*\* Results for the service area of the former East Germany not included.

Deutsche Telekom's "Telekom 2000" development program for the five eastern laender will involve DM60 billion of investment up to 1997.

—Infrastructure modernization will include the installation of 7.2 million new telephone access lines; 360,000 fax access lines; and 50,000 data connections. Around 70,000 public telephones are also to be installed.

—The mobile networks (C/D1/D2) are expected to cover more than 300,000 users. The E1 network is also to be expected to provide extra capacity. Both VSAT-based services and local Public Access Mobile Radio networks are already being employed to improve communications.

Deutsche Telekom has already successfully implemented an optical fiber-based digital overlay network in 1991 in the region. In addition, a number of turnkey projects carried out in conjunction with private industry have resulted in the installation of 550,000 telephone access lines during 1991, and a further 700,000 during 1992.

There are a number of upgrading projects being carried out by Deutsche Telekom. In particular, the implementation of optical fiber into the network is taking place through the OPAL (Optical Access Lines) and VISYON (Variable Intelligent Synchronous Optical Networks) projects.

The OPAL project has been running since June 1990. At the beginning of 1993, there were seven OPAL pilot projects in operation—in Cologne, Frankfurt, Lippetal, Leipzig, Stuttgart, Nuremberg, and Bremerhaven—testing a variety of technical concepts (e.g., broadband communications, integrated text and data network, ISDN).

The VISYON project covers the expansion of Deutsche Telekom's transmission network through the implementation of new standardized synchronous transmission equipment, which began in 1992. There are currently four pilot projects being carried out in Aachen, Dusseldorf, Hannover, and Cologne.

**Data Communications**

Deutsche Telekom provides three fixed networks suitable for data transmission:

- The public switched telephone network (PSTN)
- The public telex network
- The public Datex networks



In addition, a range of leased circuit offerings support fixed connections. Collectively, these are known as Datal services.

The Telex network, Datex networks, and data network are integrated into the Integrated Text and Data Network (IDN), set up in 1976. The IDN is entirely digital in operation.

The PSTN can be used for signaling rates of up to 4,800 bps and, despite growing competition from IDN services, still commands a very respectable percentage of German data transmission.

The core digital data transmission services are the various Datex networks:

- The Dates-L circuit-switched data network (CSDN) providing transmission at speeds of up to 9,700 bps.
- Datex-L was introduced as an interim measure to ISDN, and allows computer-to-computer communications, as well as high-speed facsimile and other kinds of data transmission. The number of subscribers is declining as users move to packet-switched and other services.
- The Datex-P public packet-switched data network (PSDN) providing transmission rates ranging from 300 bps to 64 kbps and supporting X.25, X.28, IBM 3270, and IBM 2780/3780 connection. Deutsche Telekom reported 106,000 subscribers at the end of 1992.
- Datex-M, Telekom's cell-oriented high-speed switched multi-megabit data service (SMDS), which provides a connectionless service primarily aimed at LAN interconnection.

Introduced in November 1992, Datex-M currently supports transmission speeds of between 2 Mbps and 140 Mbps in Germany and nx64K bps synchronous connection up to 2 Mbps internationally. Telekom will migrate datex-M ATM switching by the mid-1990's. Service is currently provided in 10 German cities.

- Datex-J, is designed especially to support low-volume applications such as Btx. Access can be via a modem and analog line or a digital ISDN connection.

In the western laender, Datex-J supports access at 1,200 bps using a low regional tariff, as well as 2,400 bps and 64 kbps access in some locations. During 1993, ISDN access at 64 kbps is to be provided in all western locations at the regional tariff level. In the eastern laender, because of the poor quality of many access lines, special Datex-J access points have been established providing access at 1,200 bps using the error-correction protocol MNP3.

Deutsche Telekom is currently trialing an EDI [Electronic Data Interchange] service, EDITEL. A full public service is due for launch in Spring 1994. Telekom also

offers Notice EDI and E-mail internationally through Infonet Services Deutschland.

Deutsche Telekom provides a range of enhanced voice services, currently provided separately, but to be gradually incorporated into an overall intelligent network architecture. They include:

- Service 130 Freephone
- Service 180 Teleinfo—audiotex services including entertainment, sport, weather, and dating services.
- Televotum—a service for casting votes in connection with popular radio and TV shows
- Tele-Info-Service 190-premium-rate information services

Intelligent network [IN] trials began in late 1992 in the Nord Rhein and Westphalia regions, covering most of the major cities in the Ruhr area. A commercial IN service using CCITT No. 7 signaling and based on a Siemens/Alcatel platform is expected to be launched in April 1994, with nationwide availability by 1995. Under the trial system, a limited number of services are provided, but by 1995 a full range of facilities including credit card calling, VPN [virtual private network] services, and wide area Centrex are expected to be available.

In 1989, Info AG became the first indigeneous third-party operator offering competitive data transmission services in Germany. The Info AG network currently has some 40 nodes with expansion to 80 nodes expected by the end of 1993. International links are available via Transpac—France Telecom Transpac has a 75-percent stake in Info AG—and via SprintNet. Info AG was the first private company to establish a national X.25 network with international links in Germany. At the end of 1992, Info AG's revenues from network services totaled DM23.1 million out of total revenues of DM66 million.

#### Satellite Communications

Germany has been in the vanguard of satellite deregulation in Europe since Telekom introduced a new satellite licensing scheme in 1990 aimed at improving telecommunications in the east. Licenses are granted unless the proposed system competes directly with the fixed national PSTN or is likely to lead to radio frequency problems. Recently, the system has been simplified with two types of license:

- A cheaper authorization for the general operation of one-way services and uplinks for private networks;
- A more expensive authorization for the construction of shared-hub earth stations providing two-way public services.
- Deutsche Telekom retains the sole right of access to EUTELSAT and has attracted complaints from private operators regarding its cost.

Driven by the need to deploy modern communications services in the eastern laender, Deutsche Telekom has been a European pioneer in the establishment of very small aperture terminal (VSAT) satellite service. DAVID (Direct Access for VSAT-based Interchange of Data) was launched in 1989 and now supports some 700 VSAT stations throughout Germany. Service is offered over both the German Kopernicus satellite system and over the Eutelsat satellite providing access to large areas of eastern Europe, the CIS states beyond Moscow, and some Mediterranean countries.

Telekom's FVSAT service offers point-to-point satellite connections with transmission rates of 64 and 128 kbps between small earth stations installed on the customers' premises. FVSAT provides transmission of data and voice.

In addition, a significant number of private operators have been granted licenses to operate competitive satellite services in Germany. DAVID's two main rivals are TELEPORT EUROPE and ANT Bosch Telekom. Both have invested large sums constructing their own shared-hub earth stations for the provisions of data, voice, and video services.

### Mobile Communications

The mobile communications sector is one of the most competitive areas in German telecommunications. The dominant operator is still Telekom, but it faces mounting pressure from consortia operating digital mobile networks. Telekom has been quick off the mark to upgrade its mobile offerings, which were widely used in the former East Germany to improve telecommunications between the two former states.

According to Northern Business Information/Datapro, Mannesmann Mobilfunk took 11 percent of the total mobile cellular market (excluding paging and mobile data) during 1992, with Deutsche Telekom taking the remaining 89 percent—NBI/Dtapro predicts Mannesmann's share to rise to just under 30 percent by 1997 with the E-Plus consortium taking just over 14 percent of the market (see table 3).

**Deutsche Telekom and Mannesmann Mobilfunk: Cellular Subscribers and Revenues**

|                               | 1992    | 1993*     | 1994*     |
|-------------------------------|---------|-----------|-----------|
| <b>SUBSCRIBERS</b>            |         |           |           |
| Deutsche Telekom**            | 801,995 | 1,121,658 | 1,221,927 |
| Mannesmann Mobilfunk          | 100,000 | 350,000   | 437,500   |
| <b>REVENUES (DM billions)</b> |         |           |           |
| Deutsche Telekom              | 1.79    | 2.46      | 3.5       |
| Mannesmann Mobilfunk          | 0.14    | 1.13      | 1.34      |

Notes:

1) \* estimated.

2) \*\* includes C1, B/B2, and D1 network subscribers.

Source: Northern Business Information/Datapro

### B/B2 Network

Introduced in 1972, the B network was expanded in 1977, becoming the B2 network. Apart from Germany, coverage is also offered in Luxembourg, Austria, and the Netherlands. The B/B2 network reached its greatest number of subscribers in 1986 with 27,000 and this has now declined to around 10,000 (early 1993)—the network is to cease operation at the end of 1994.

### C Network

Following trial operations in 1985, Telekom's analog cellular mobile radio system, C network was launched commercially in June 1986. The C network expanded rapidly with almost complete national coverage from the outset. Due to the increase in demand, the original capacity of 100,000 has been extended to around 800,00 at the beginning of 1993. According to Northern Business Information/Datapro estimates, Deutsche Telekom's C network subscribers totaled 795,618 in early 1993. Although digital networks are gaining new subscribers all the time, Telekom intends to keep the C network running beyond the year 2000.

### D Networks

The two D networks are both digital mobile networks based on the GSM [Global System for Mobile Communications] standard using the 900-MHz frequency. D1 is operated by Deutsche Telekom, while D2, is operated by Mannesmann Mobilfunk, a subsidiary of the giant steel and industrial conglomerate Mannesmann AG. Having been granted its license in December 1989, Mannesmann began operations in July 1991. This marked an important stage in the drive to liberalization for German telecommunications. Deutsche Telekom's D1 network is scheduled to provide:

- Data service up to 2,400 bps circuit-switched (asynchronous) transmission by the end of 1993;
- Data service up to 9,600 bps circuit-switched (asynchronous/synchronous) transmission by the end of 1994;
- Packet-switched data transmission services up to 9,600 bps by the end of 1996.

Only nine months after Mannesmann's D2 network became operational, the operator was able to announce in March 1993 a total of 200,000 subscribers. Roaming agreements had also been made with nine European countries and others were under discussion.

### E1 Network

Following the award of Mannesmann's license, Germany has been looking to grant a third concession for a digital cellular mobile network. The E1 network is the newest addition to Germany's digital cellular mobile offerings and is similar to the Personal Communications Network (PCN). In February 1993, Mr. Wolfgang Botsch, the new Minister for Posts and Telecommunications announced



that the multinational consortium, E-Plus, had been awarded a license to operate one of the world's largest digital cellular networks. The consortium comprises: the German industrial groups Thyssen (28 percent) and Veba (28 percent), BellSouth of the United States (21 percent), and Vodafone of the UK (16 percent). The remaining seven percent is accounted for by several German enterprises in the new Federal States and the French banking group Caisse des Depots et Consignation.

Like the D networks, E1 is also GSM-based; however, it uses the less crowded 1,800-MHz frequency and is therefore similar to the Personal Communications Network (FCN). It is estimated that by the end of 1995, the system will cover 88 percent of Germany and will have the capacity to support up to 3 million subscribers by the end of the decade. According to the FINANCIAL TIMES, an initial investment of DM 4.8 billion is required from the consortium and a further DM3 billion from suppliers.

#### Telepoint

In October 1990, telepoint field trials were commenced in Munster using CT1+ [cordless telephone] (CEPT [European Conference of Postal and Telecommunications Offices]). CT1+ was chosen as the technology, since at that time Deutsche Telekom was experiencing delays in receiving CT2/CAI equipment from Siemens/GPT for its telepoint network.

At the end of the 12-month trial, CT1+ was ruled out as too few suppliers were prepared to supply equipment.

CT2-based telepoint field trials, known as Birdie, commenced in Munich in November 1991. The trials experienced no major problems, and in October 1992, Deutsche Telekom was predicting 500,000 subscribers to its Birdie service by 1996. However, at the end of 1992, it was decided to abandon Birdie because the potential market and threat of competition from cheaper cellular services did not warrant the risk of a service launch. However, it may be relaunched if the German market evolves differently.

#### Chekker

Chekker is Deutsche Telekom's regional analog trunked radio network, currently operating in 25 regions of Germany—some competing with privately operated networks. The networks are mainly used for in-house communication, i.e., fleet management, customer support. The network may possibly be extended for cross-border communications with Switzerland and the Netherlands, as well as for access to the public network.

#### Modacom

Deutsche Telekom's latest mobile service is Modacom, a mobile X.25 connection for mobile data communication. The service is designed for frequent, high-quality data transmission and aimed specifically at the transport

industry. Deutsche Telekom has been running a pilot project in the Rhine/Ruhr region since February 1992. Due to the success of this trial, Deutsche Telekom decided to offer the service in eight of Germany's major industrial areas. The trial is being extended nationwide by the end of 1993.

At present there is no international standard for the service, and Modacom is based on the Motorola company standard. As the major equipment supplier, Motorola has supplied 40 base stations and two regional control centers for the DM11 million project. Trials are on-going with courier services, taxis, transport agencies, and distribution agencies.

#### Paging—Cityruf

According to Deutsche Telekom, Cityruf, which was launched in 1989, is now experiencing an average growth rate of 6,000 subscribers per month. At the beginning of 1993, the service had around 220,000 subscribers. Cityruf has a tone signal as well as being able to transmit short messages.

—Since the end of 1990, Cityruf customers have been able to use their pagers in five European countries via the Euromessage service, which is based on Cityruf.

—Deutsche Telekom is also part of the European Radio Message System (ERMES) which aims to provide pan-European digital paging by the end of 1993.

#### Video Services

Deutsche Telekom is one of six European telecommunications operators, along with BT, France Telecom, PTT Telecom Netherlands, SIP, and Norwegian Telecom, that has formally agreed a Memorandum of Understanding (MoU) to cooperate in establishing a pan-European videotelephony service—European Videotelephony (EV). The MoU has a duration of five years, and the signatories have agreed to verify and implement the service definition according to CCITT H.320 and other international videotelephony standards as they become available. Deutsche Telekom hopes to introduce its videotelephony service during 1994 and 1995.

#### Text Communications

Deutsche Telekom offers a number of text communications services including telex, teletex, telefax, and videotex.

#### Teletex

Introduced in 1981, teletex is promoted as a replacement for the aging telex. International connections are available to Austria, Canada, France, Italy, Luxembourg, the Netherlands, Scandinavia, Switzerland, Turkey, and the United States.

### Telefax

Telefax 400 is an enhanced fax service which provides a wide range of features. Transmission is over digital lines offering enhanced speed and quality of transmission. Access is provided for Group 3 fax machines and PCs with integrated fax card, and access for Group 4 machines operating over ISDN connections is to be provided. Telefax is one of the fastest growing communications services in Germany; Telekom reported some 696,000 telefax connections in 1990 and 946,000 in 1991.

### E-Mail

Germany's store-and-forward e-mail service, Telebox 400, introduced in 1986, is X.400-compliant and provides nationwide coverage. X.435 support is to be provided during 1993. Telebox 400 had 6,483 subscribers in May 1993.

In addition to the public services and local mail systems connected over the public network, there are also a number of major private e-mail networks in use. The academic DFN network has over 15,000 X.400 e-mail users, while major companies such as Daimler-Benz, Hoechst, and BASF also have large e-mail networks.

### Videotex

Bildschirmtext (Btx) is Germany's interactive videotex system. As with the UK's Prestel system, Telekom has had only limited success with its service and in the past has considered emulating France Telecom's Teletel system by providing videotex terminals free of charge. Now, however, it has apparently decided to reposition the service as a vehicle for higher-value information and low-volume communications requirements. In late 1992, Telekom began restructuring Btx. This involves integrating Btx and the Datex-J network and offering ISDN access to users. A wider range of transmission, messaging, and information facilities are being provided. Btx/Datex-J supports a high level of integration with other Telekom services (e.g., providing access to the Datex-P network, Telefax 400, and Telebox 400 services). Connection to videotex services in France, the UK, and the Netherlands is provided, while connection to systems in Switzerland, Austria, Luxembourg, and Finland is in progress. Telekom aims to provide a "quality business information bank" via Btx and to attract more high-value information providers to the service. At the beginning of 1993, there were some 362,125 customers and 802 information providers.

### ISDN

Deutsche Telekom has been one of the leading European telecommunications operators in the deployment of advanced network facilities such as broadband services and ISDN. Following digitization of the telecommunications network (started in 1984), pilot ISDN networks were established in 1987 in Mannheim and Stuttgart.

In the western laender, Telekom has offered national ISDN service (1 TR6) commercially since 1989. By the

end of 1993, Telekom plans to offer full territorial coverage in the western laender.

Installation of ISDN in the five eastern laender began in 1990. Implementation is proceeding at a much slower pace, since it obviously depends on how quickly Telekom can now rebuild the basic infrastructure and digitalize the switching system. The first ISDN accesses in the eastern sector have been available in certain cities since Spring 1992, but without CCS7 connection (i.e., "ISDN islands"). By the end of 1992, CCS7 interconnections of these "islands" with the west German laender and international ISDN network were also available. Around 15 percent of business customers have access to ISDN services in the eastern sector. A commercial service is planned for the end of 1993 and total territorial coverage by 1995.

At the end of 1992, 1,919 German cities had access to ISDN services. As of June 1993, there were 192,342 basic rate access and 14,520 primary rate access connections. By 1995, Telekom plans to have installed 700,000 basic rate access connections and 27,400 primary rate access connections. An "offensive" introduction of services based on broadband ISDN is promised in 1994 with the launch of a field trial based on ATM switching at speeds of up to 600 Mbps. Telekom has been operating an experimental broadband metropolitan area network in Berlin called BERKOM, since 1986.

Within Europe, international interconnection is planned with all Euro-ISDN MoU signatories during 1993. Interconnection (based on the ISUP signaling system) is planned during 1993 with Switzerland, Australia, the UK, Japan, Canada, New Zealand, the Netherlands, Austria, Sweden, and the United States. A pilot Euro-ISDN network is to be launched in October 1993 and a commercial service in December 1993, with total territorial coverage available by May 1994 (to include the eastern laender in 1995).

### The Future

On a political level, there was much opposition to the discussion of Deutsche Telekom's privatization plans during early 1993 and, with elections due in 1994, it was not judged by some to lie very high on the political agenda. Nevertheless, the privatization is to go ahead.

Privatization of Deutsche Telekom will mean the end of the cross-subsidization of the DBP's postal and banking services—an extra responsibility Telekom can ill afford. Telekom's immediate priorities continue to lie in the modernization of the telecommunications network in the five east German laender, as well as developing its global activities. Deutsche Telekom will not be the only beneficiary of its expanding international presence; the existing equipment suppliers to Telekom will also have much to gain, and the need for Deutsche Telekom to compete against other operators will inevitably push down tariffs, thereby benefiting telecommunications users.

### **European Affairs: EC Sponsors Digital Cordless Telephone Trial**

BR1211084293 London *MOBILE COMMUNICATIONS INTERNATIONAL* in English  
Oct 93 p 11

[Unattributed article: "EC Sponsors DECT Trial"]

[Text] The European Commission has retained Scientific Generics to carry out trials on the application of DECT technology to local loop, neighbourhood telepoint and telepoint applications. One of the key objectives of these trials is to demonstrate the potential of DECT as a solution for rapidly modernising the telecommunications infrastructures of central and eastern Europe. The project will comprise a number of proving trials in the UK followed by a live demonstration in Hungary.

The UK trials will address two issues; at which ranges can consistent speech quality be maintained in different environments and with different antenna arrangements; and, based on these ranges, would different DECT application scenarios be economically viable? After the UK tests, the Hungarian trial systems will illustrate the potential of DECT in radio local loop and neighbourhood telepoint applications. Scientific Generics has formed a consortium with Dancall Radio A/S, the Hungarian Telecommunications Company (HTC), DBP Telekom, Swedish Telecom, BT and Quotient Communications, to carry out the testing and demonstration.

### **European Affairs: European Digital TV Broadcasts To Begin in 1995**

MI0911160693 Munich *SUEDDEUTSCHE ZEITUNG* in German 15 Oct 93 p 28

[Text] According to Pierre Meyrat, several major television channel operators are gearing up to go on the air with digital television broadcasts in 1995. Although the director general of the European Satellite Corporation (SES) in Betzdorf, Luxembourg, regards this as an "ambitious goal," he is also working on the assumption that the requisite technical facilities will already be in place and reception equipment available the year after. SES has therefore now placed the contract for a sixth satellite, to be used for its "Astra" television broadcasting system. Digital television will present viewers with hundreds of programs.

With present-day analog television broadcasting, one broadcast takes up a whole satellite transponder (transmission channel). Digital technology, however, makes it possible to compress image data, with the result that one channel can accommodate several programs. Although the original idea was four programs per channel, Meyrat says that 16 broadcasts per channel (depending on type and quality) is now the goal.

#### **Hundreds of Programs**

Transmission capacity for hundreds of programs will thus be available in a few years. This begs the question of

who will take up all this capacity and who will watch all the broadcasts. Meyrat is confident: "There will not be one single additional television channel, indeed there may well be fewer. However, the programs will be presented differently." In order to allow the viewer to tune in at any time, broadcasts of the same programs could be staggered (starting, say, every 15 minutes). Several programs would also run simultaneously (instead of in sequence), and an increase in niche programs (sport, music, etc.) could be expected. The repeated, staggered broadcasting of films would in itself almost be enough to achieve the goal of "video on demand" pursued in the United States (by the telecommunications corporations and the cable television operators). This would make digital television "the video hire shops' greatest competitor," Meyrat told journalists in Munich.

This new television technology, for which the viewer requires either a decoder or a new TV set, will initially be supplied in the form of pay-TV channels (subscription television), said Meyrat. This could subsequently be followed by "pay per view"—whereby the viewer only pays for the individual programs actually "consumed." The head of SES also expects that there will be dual transmission ("simulcast") of the same programs in analog and digital technology over a transitional period to serve both viewers with "old" and receiving sets and those with new ones.

The starting pistol for digital television will already be fired in 1994 in the United States, where the DirecTV Group (a joint venture set up by the Hughes space group and a number of television operators) will broadcast up to 160 programs at a time via two satellites. The first satellite is scheduled to go into orbit before the end of the current year. The decoder required for reception will be marketed by a subsidiary of the French Thomson group at around \$700.

SES hopes to benefit from American experience when it begins digital broadcasting in 1995. A worldwide standard (Empeg II) would be established next month, said Meyrat, after which the home electronics industry could begin developing the new receiving sets. He believed they ought to come onto the market at the International Broadcasting Show in 1995. Meyrat saw no competitive threat to digital television in the planned enhancement of the PAL [phase alternation line] and PALPlus standards (based on the new 16:9 wide-screen format).

#### **More Satellites**

In view of these prospects, SES has awarded the contract for the sixth satellite for its Astra television broadcasting system to Hughes Space and Communications Inc., Los Angeles. The Luxembourg-based company is currently working with three satellites that command over 50 analog channels. "Astra 1D" will follow in 1994, and "Astra 1E" (with the first transponders for digital television) at the beginning of 1995. The sixth satellite (Astra 1F) is scheduled to raise overall capacity to 64 analog and 40 digital transponders in 1996.

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**DATE FILMED**

8 DEC 1993